WHAT IS CLAIMED IS:

1 An isolated or purified nucleic acid molecule consisting essentially of a nucleotide sequence encoding transductin-2 (TDC2) or a fragment thereof comprising at least 110 contiguous nucleotides.

2. The isolated or purified nucleic acid molecule of claim 1, wherein the TDC2 is human.

3. The isolated or purified nucleic acid molecule of claim 1, which (i) encodes the amino acid sequence of SEQ ID NO: 4 or a fragment thereof comprising at least 70 contiguous amino acids, (ii) consists essentially of the nucleotide sequence of SEQ ID NO: 3 or a fragment thereof comprising at least 110 contiguous nucleotides, (iii) hybridizes under moderately stringent conditions to an isolated or purified nucleic acid molecule consisting essentially of the nucleotide sequence that is complementary to SEQ ID NO: 3 or a fragment thereof, or (iv) shares 49% or more identity with SEQ ID NO: 3.

4. The isolated or purified nucleic acid molecule of claim 1, which (i) encodes the amino acid sequence of SEQ ID NO: 8 or a fragment thereof comprising at least 71 contiguous amino acids, (ii) consists essentially of the nucleotide sequence of SEQ ID NO: 7 or a fragment thereof comprising at least 110 contiguous nucleotides, (iii) hybridizes under moderately stringent conditions to an isolated or purified nucleic acid molecule consisting essentially of the nucleotide sequence that is complementary to SEQ ID NO: 7 or a fragment thereof, or (iv) shares 41% or more identity with SEQ ID NO: 7.

5. An isolated or purified nucleic acid molecule consisting essentially of a nucleotide sequence that is complementary to either of a nucleotide sequence encoding human TDC2 or a fragment thereof.

6. The isolated or purified nucleic acid molecule of claim 5, which (i) is complementary to a nucleotide sequence encoding the amino acid sequence of SEQ ID NO: 4 or a fragment thereof comprising at least 70 contiguous amino acids, (ii) is complementary to the nucleotide sequence of SEQ ID NO: 3 or a fragment thereof comprising at least 110 contiguous nucleotides, (iii) hybridizes under moderately stringent conditions to an isolated or purified nucleic acid molecule consisting essentially of SEQ ID NO: 3 or a fragment thereof, or (iv) shares 49% or more identity with the nucleotide sequence that is complementary to SEQ ID NO: 3.

7. A vector comprising the isolated or purified nucleic acid molecule of claim 1.

8. A vector comprising the isolated or purified nucleic acid molecule of claim 5.

9. A composition comprising the isolated or purified nucleic acid molecule of claim 1, optionally in the form of a vector, and a pharmaceutically acceptable carrier.

10. A composition comprising the isolated or purified nucleic acid molecule of claim 5, optionally in the form of a vector, and a pharmaceutically acceptable carrier.

11. A cell comprising the vector of claim 7.

12. A cell comprising the vector of claim 8.

13. An isolated or purified polypeptide molecule consisting essentially of an amino acid sequence encoding TDC2 or a fragment thereof comprising at least 71 contiguous amino acids, either one of which is optionally glycosylated, amidated, carboxylated, phosphorylated, esterified, N-acylated or converted into an acid addition salt.

14. The isolated or purified polypeptide molecule of claim 13, wherein the TDC2 is human TDC2.

15. The isolated or purified polypeptide molecule of claim 13, which (i) is encoded by the nucleotide sequence of SEQ ID NO: 3 or a fragment thereof comprising at least 213 contiguous nucleotides, (ii) consists essentially of the amino acid sequence of SEQ ID NO: 4 or a fragment thereof comprising at least 71 contiguous amino acids or (iii) shares 31% or more identity with SEQ ID NO: 4.

16. The isolated or purified polypeptide molecule of claim 13, which (i) is encoded by the nucleotide sequence of SEQ ID NO: 7 or a fragment thereof comprising at least 213 contiguous nucleotides, (ii) consists essentially of the amino acid sequence of SEQ ID NO: 8 or a fragment thereof comprising at least 71 contiguous amino acids or (iii) shares 34% or more identity with SEQ ID NO: 8.

17. A composition comprising the isolated or purified polypeptide molecule of claim 13 and a pharmaceutically acceptable carrier.

18. A cell line that produces a monoclonal antibody that is specific for the isolated or purified polypeptide molecule of claim 13.

19. The monoclonal antibody produced by the cell line of claim 18.

20. A method of detecting hearing loss or a predisposition to hearing loss in an animal, which method comprises detecting at least one mutation in a gene encoding TDC2 in a test sample comprising a nucleic acid comprising the TDC2 gene obtained from the animal, wherein the at least one mutation is indicative of hearing loss or a predisposition to hearing loss in the animal.

21. A method of determining the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene in a test sample comprising a nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene obtained from an animal, which method comprises assaying the test sample for the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene, wherein a decrease in the level of nucleic acid comprising the wild-type TDC2 gene and/or an increase in the level of nucleic acid comprising a mutant TDC2 gene in the test sample as compared to a control sample is indicative of hearing loss or a predisposition to hearing loss in the animal.

22. The method of claim 21, wherein the method is used for prognosticating hearing loss in the animal, which method further comprises comparing the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene in the test sample to the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene, respectively, in another test sample obtained from the animal over time, wherein a decrease in the level of nucleic acid comprising the wild-type TDC2 gene and/or an increase in the level of nucleic acid comprising a mutant TDC2 gene is indicative of an unfavorable prognosis, an increase in the level of the nucleic acid comprising the wild-type TDC2 gene and/or a decrease in the level of the nucleic acid comprising a mutant TDC2 gene is indicative of a favorable prognosis, and no change in the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene is indicative of no change in the hearing loss.

23. The method of claim 21, wherein the method is used for assessing the efficacy of treatment of hearing loss in the animal with a given anti-hearing loss agent, which method further comprises comparing the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene in the test sample to the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene, respectively, in another test sample obtained from the animal over time, wherein a decrease in the level of nucleic acid comprising the wild-type TDC2 gene and/or an increase in the level of nucleic acid comprising a mutant TDC2 gene is indicative of the anti-hearing loss agent being effective, an increase in the level of the nucleic acid comprising the wild-type TDC2 gene and/or a decrease in the level of the nucleic acid comprising a mutant TDC2 gene is indicative of the anti-hearing loss agent being ineffective, and no change in the level of nucleic acid comprising the wild-type TDC2 gene and/or a mutant TDC2 gene is indicative of no change in the hearing loss due to treatment with the anti-hearing loss agent.

24. A method for detecting hearing loss or a predisposition to hearing loss in an animal, which method comprises detecting a mutant TDC2 in a test sample comprising protein comprising TDC2 obtained from the animal, wherein the presence of a mutant TDC2 in the test sample is indicative of hearing loss or a predisposition to hearing loss in the animal.

25. A method of determining the level of wild-type TDC2 and/or a mutant TDC2 in a test sample comprising protein comprising wild-type TDC2 and/or a mutant TDC2 obtained from an animal, which method comprises assaying the test sample for the level of wild-type TDC2 and/or a mutant TDC2, wherein a decrease in the level of wild-type TDC2 and/or an increase in the level of a mutant TDC2 in the test sample as compared to a control sample is indicative of hearing loss or a predisposition to hearing loss in the animal.

26. The method of claim 25, wherein the method is used for prognosticating a hearing loss in the animal, which method further comprises comparing the level of wild-type TDC2 and/or a mutant TDC2 in the test sample to the level of wild-type TDC2 and/or a mutant TDC2, respectively, in another test sample obtained from the animal over time, wherein a decrease in the level of wild-type TDC2 and/or an increase in the level of a mutant TDC2 is indicative of an unfavorable prognosis, an increase in the level of the wild-type TDC2 and/or a decrease in the level of a mutant TDC2 is indicative of a favorable prognosis, and no change in the level of the wild-type TDC2 and/or a mutant TDC2 is indicative of no change in the hearing loss.

27. The method of claim 25, wherein the method is used for assessing the efficacy of treatment of hearing loss in the animal with a given anti-hearing loss agent, which method further comprises comparing the level of wild-type TDC2 and/or a mutant TDC2 in the test sample to the level of wild-type TDC2 and/or a mutant TDC2, respectively, in another test sample obtained from the animal over time, wherein a decrease in the level of the wild-type TDC2 and/or an increase in the level of a mutant TDC2 is indicative of the anti-hearing loss agent being effective, an increase in the level of the wild-type TDC2 and/or a decrease in the level of a mutant TDC2 is indicative of the anti-hearing loss agent being ineffective, and no change in the level of the wild-type TDC2 and/or a mutant TDC2 is indicative of no change in the hearing loss due to treatment with the anti-hearing loss agent.

28. A method of treating an animal prophylactically or therapeutically for hearing loss, wherein the hearing loss is due to a complete or partial loss of wild-type TDC2, which method comprises providing TDC2 to the animal, whereupon the animal is treated prophylactically or therapeutically for hearing loss.

29. The method of claim 28, wherein TDC2 is provided to the animal by administering to the animal a nucleic acid encoding and expressing wild-type TDC2.

30. The method of claim 28, wherein TDC2 is provided to the animal by administering to the animal the wild-type TDC2 protein.

31. A method of identifying one or more agent(s) which interact with a TDC2 gene in a cell, which method comprises administering one or more agent(s) to the cell comprising the TDC2 gene and assaying the expression level of the TDC2 gene by the cell, wherein an increase or decrease in the expression level of the TDC2 gene is indicative of an interaction between one or more agents and the TDC2 gene in the cell.